

CLAIMS:

Please cancel claims 1-50.

Please add the following new claims 51-91:

- 1 51. (Newly Added) A low-resistance resistor comprising:
2 a resistor element made of a metal sheet; and
3 a metal terminal disposed at both ends of said resistor element,
4 said terminal has an electrical conductivity equal to or greater
5 than that of said resistor element, and
6 said terminal has a groove of a width fittable to said resistor
7 element, and;
8 said resistor element and said terminal are electrically connected
9 by inserting said resistor element into said groove with a third metal in
10 between.
- 1 52. (Newly Added) The low-resistance resistor as defined in
2 Claim 51, wherein a thickness of said terminal is thicker than a total
3 thickness of said resistor element.
- 1 53. (Newly Added) The low-resistance resistor as defined in
2 Claim 51, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.
- 1 54. (Newly Added) The low-resistance resistor as defined in
2 Claim 53, wherein said insulating layer completely covers said resistor
3 element.

1 55. (Newly Added) The low-resistance resistor as defined in
2 Claim 53, wherein said insulating layer is made of at least one of epoxy
3 resin, polyimide resin, and poly-carbodiimide resin.

Q
C64
1 56. (Newly Added) A low-resistance resistor comprising:
2 a resistor element made of metal sheet;

3 an insulating substrate disposed at least on one of top and
4 bottom faces of said resistor element;

5 a terminal having a groove of a width equivalent to a sum of a
6 thickness of said resistor element and said insulating substrate; and

7 a third metal formed between said resistor element and said
8 groove;

9 wherein said resistor element and said terminal are electrically
10 connected through said third metal.

1 57. (Newly Added) The low-resistance resistor as defined in
2 Claim 56, wherein said insulating substrate is made of one of alumina, glass,
3 glass impregnated epoxy resin substrates, and paper impregnated phenolic
4 resin substrates.

1 58. (Newly Added) The low-resistance resistor as defined in
2 Claim 56,

3 wherein an insulating layer covers a part of a surface of said
4 resistor element.

1 59. (Newly Added) The low-resistance resistor as defined in
2 Claim 56, wherein a thickness of said terminal is at least three times of a sum
3 of a thickness of said resistor element and a thickness of said insulating
4 substrate.

1 60. (Newly Added) A low-resistance resistor comprising:

2 a resistor element made of metal sheet; and

3 a metal terminal disposed at both ends of said resistor element,
4 said terminal being made of metal having greater electrical conductivity than
5 that of said resistor element, and having an L shape section face;

6 wherein said resistor element and said terminal are electrically
7 connected through a third metal.

1 ~~61.~~ (Newly Added) The low-resistance resistor as defined in
2 Claim 60, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.

1 ~~62.~~ (Newly Added) A low-resistance resistor comprising:
2 a resistor element made of metal sheet:

3 an insulating sheet attached to at least one face of said resistor
4 element; and

5 a metal terminal disposed at both ends of said resistor element,
6 said terminal being made of metal having greater electrical conductivity than
7 that of said resistor element, and having an L shape section face;

8 wherein said resistor element and said terminal are electrically
9 connected through a third metal.

1 ~~63.~~ (Newly Added) A resistor comprising:
2 a metal resistor element provided with a step between both ends
3 by making a thickness of said both ends thicker than a central portion; and

4 a metal terminal disposed at both ends of said resistor element,
5 said terminal having a one-side-open section face with an inner space broader
6 than its opening, and being electrically connected to said step of said resistor
7 element at least at said inner space of the opening.

1 ~~64.~~ (Newly Added) A low-resistance resistor comprising:

2 a resistor element made of metal sheet;

3 an insulating substrate; and

4 at least two metal terminals formed in a way to electrically
5 connect top and bottom faces of said insulating substrate;

6 wherein said resistor element and said metal terminals are
7 electrically connected through a third metal.

1 65. (Newly Added) The low-resistance resistor as defined in
2 Claim 64, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.

1 66. (Newly Added) The low-resistance resistor as defined in
2 Claim 64, wherein said insulating substrate is made of one of alumina, glass,
3 glass impregnated epoxy resin substrates, and paper impregnated phenolic
4 resin substrates.

1 67. (Newly Added) A low-resistance resistor comprising:
2 a resistor element made of metal sheet; and

3 four metal terminals, said terminals being disposed one each on
4 top and bottom faces at both ends of said resistor element, and electrically
5 connected to said resistor element through third metal.

1 68. (Newly Added) The resistor as defined in Claim 67,
2 wherein a width of said terminals are not less than a width of said resistor
3 element.

1 69. (Newly Added) The resistor element as defined in Claim
2 67, wherein said terminals disposed on top and bottom faces at both ends of
3 said resistor element are electrically connected to each other.

1 70. A resistor comprising:
2 a metal resistor element having a notch near both ends; and

3 a metal terminal disposed at both ends of said resistor element,
4 said terminal having a protrusion corresponding to said notch;

5 wherein said resistor element and said terminal are electrically
6 connected at least through said protrusion and said notch.

Q
cont
1 ~~71.~~ (Newly Added) A resistor comprising:

2 a metal resistor element having at least two through holes; and

3 a metal terminal having at least one protrusion with a same
4 shape as said through holes;

5 wherein at least one protrusion of said terminal is inserted to at
6 least one through hole of said resistor element, and at least one face of said
7 terminal is electrically connected to said resistor element.

1 ~~72.~~ (Newly Added) The low-resistance resistor as defined in
2 Claim 67, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.

1 ~~73.~~ (Newly Added) The low-resistance resistor as defined in
2 Claim 70, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.

1 ~~74.~~ (Newly Added) The low-resistance resistor as defined in
2 Claim 71, wherein at least a part of a surface of said resistor element is
3 covered with an insulating layer.

4 75. (Newly Added) A method for manufacturing a low-
5 resistance resistor comprising:

6 forming a resistor element made of a metal sheet, said resistor
7 element having a shape adjusted to obtain a predetermined resistance;

8 forming a metal terminal having a groove;

9 fitting said terminal to both ends of said resistor element; and

10 electrically connecting said resistor element and said terminal;
11 wherein a third metal layer is formed on at least one of
12 a) a connecting portion of said resistor element, and
13 b) connecting portion of said terminal
14 before fitting said terminal to said resistor element.

1 76. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 75, further comprising the step of
3 forming an insulating layer except on said terminal after said step of
4 electrical connection.

1 77. (Newly Added) A method for manufacturing a resistor
2 comprising:

3 forming a terminal made of a metal foil pattern with a
4 predetermined shape on a part of top and bottom faces of an insulating
5 substrate, said terminal being electrically connected to top, side, and bottom
6 faces of said insulating substrate;

7 dividing said insulating substrate into a predetermined shape;

8 forming a metal resistor element, said resistor element having a
9 shape adjusted to obtain a predetermined resistance;

10 electrically connecting said resistor element to the metal foil
11 pattern on the top face of said insulating substrate.

1 78. (Newly Added) A method for manufacturing a resistor
2 comprising:

3 forming a metal resistor element, said resistor element being
4 adjusted to obtain a predetermined resistance;

5 forming a block of metal terminal having at least one
6 protrusion;

7 creating at least two through holes at a predetermined position
8 of said resistor element;

9 inserting at least one of said protrusion into at least one of said
10 through hole;

11 folding an open side of said terminal to hold said resistor in a
12 thickness direction; and

13 electrically connecting said resistor element and said terminal.

1 79. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 75, wherein said terminal is
3 electrically connected to both ends of said resistor element by one of
4 pressing, caulking, and cold forging, and then one of heating, thermal
5 compression bonding, brazing, and ultrasonic welding.

1 80. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 75, wherein said step of forming said
3 third metal layer is implemented by one of plating and paste printing.

1 81. (Newly Added) The method for manufacturing a resistor
2 as defined Claim 75, wherein said step of electrically connecting said resistor
3 element and terminal comprises :

4 coating said at least one of said resistor element and terminal
5 with metal different from that used for forming said resistor element and said
6 terminal;

7 connecting said resistor element and said terminal, after
8 assembling coated resistor element and terminal, by one of brazing, pressing,
9 and ultrasonic welding.

1 82. (Newly Added) A method for manufacturing a resistor
2 comprising:

3 forming a metal resistor element, said resistor element having a
4 shape adjusted to obtain a predetermined resistance;

5 forming one of a notch and groove at a predetermined position
6 of said resistor element;

7 forming a block of metal terminal with a predetermined shape,
8 said terminal having at least one protrusion;

9 sandwiching said resistor element with said terminal, and
10 inserting said protrusion into one of said notch and groove; and

11 electrically connecting said resistor element and said terminal.

1 83. (Newly Added) A method for manufacturing a resistor
2 comprising:

3 forming a resistor element made of metal sheet, said resistor
4 element having a shape adjusted to obtain a predetermined resistance; and
5 having one of at least two through holes, notches, grooves, and cavities;

6 forming a terminal made of metal strip, said terminal being one
7 of sandwiched and folded on top, bottom, and side faces at both ends of said
8 resistor element, and a part of metal being inserted and fixed to one of said
9 through holes, notches, grooves, and cavities of said resistor element; and

10 electrically connecting said resistor element and said terminal.

1 84. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 76, wherein a step of trimming
3 resistance is added before said step of forming said insulating layer.

1 85. (Newly Added) The low-resistance resistor as defined in
2 Claim 52, wherein a thickness of said terminal is at least three times of a
3 total thickness of said resistor element.

1 86. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 76, wherein said terminal is

62
604

3 electrically connected to both ends of said resistor element by one of
4 pressing, caulking, and cold forging, and then one of heating, thermal
5 compression bonding, brazing, and ultrasonic welding.

1 87. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 77, wherein said terminal is
3 electrically connected to both ends of said resistor element by one of
4 pressing, caulking, and cold forging, and then one of heating, thermal
5 compression bonding, brazing, and ultrasonic welding.

1 88. (Newly Added) The method for manufacturing a low-
2 resistance resistor as defined in Claim 78, wherein said terminal is
3 electrically connected to both ends of said resistor element by one of
4 pressing, caulking, and cold forging, and then one of heating, thermal
5 compression bonding, brazing, and ultrasonic welding.

1 89. (Newly Added) The method for manufacturing a resistor
2 as defined in Claim 76, wherein said step of electrically connecting said
3 resistor element and terminal comprises :

4 coating said at least one of said resistor element and terminal
5 with metal different from that used for forming said resistor element and said
6 terminal;

7 connecting said resistor element and said terminal, after
8 assembling coated resistor element and terminal, by one of brazing, pressing,
9 and ultrasonic welding.

1 90. (Newly Added) The method for manufacturing a resistor
2 as defined in Claim 77, wherein said step of electrically connecting said
3 resistor element and terminal comprises :

4 coating said at least one of said resistor element and terminal
5 with metal different from that used for forming said resistor element and said
6 terminal;

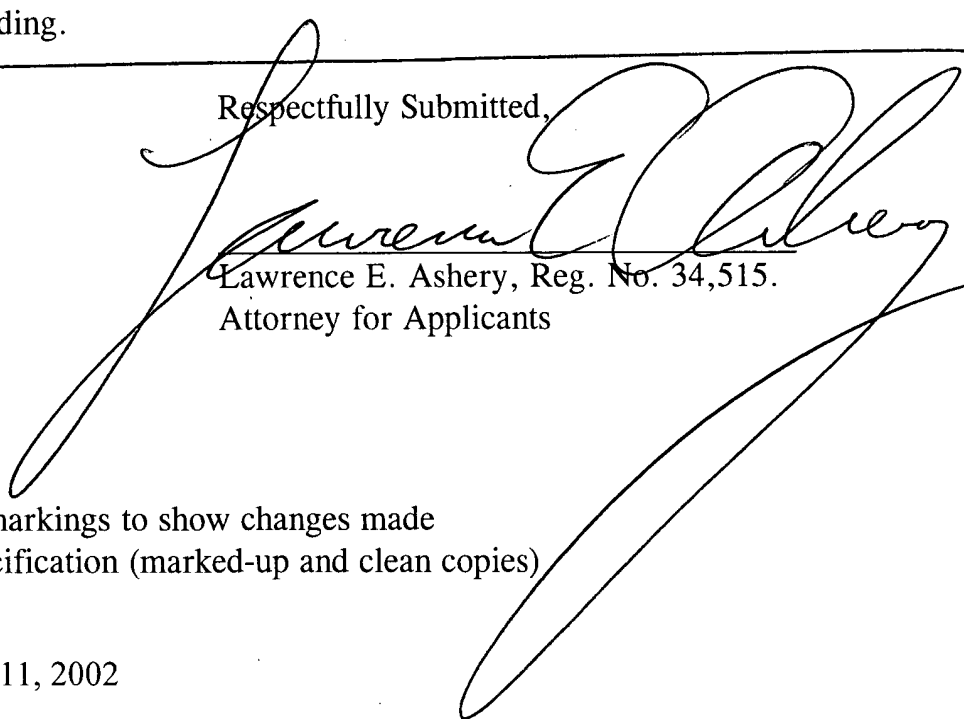
Q
end
7 connecting said resistor element and said terminal, after
8 assembling coated resistor element and terminal, by one of brazing, pressing,
9 and ultrasonic welding.

1 91. (Newly Added) The method for manufacturing a resistor
2 as defined in Claim 78, wherein said step of electrically connecting said
3 resistor element and terminal comprises :

4 coating said at least one of said resistor element and terminal
5 with metal different from that used for forming said resistor element and said
6 terminal;

7 connecting said resistor element and said terminal, after
8 assembling coated resistor element and terminal, by one of brazing, pressing,
9 and ultrasonic welding.

Respectfully Submitted,


Lawrence E. Ashery, Reg. No. 34,515.
Attorney for Applicants

LEA/jam/dlm

Enclosures:

Version with markings to show changes made
Substitute Specification (marked-up and clean copies)

Dated: September 11, 2002

P.O. Box 980
Valley Forge, PA 19482-0980
(610) 407-0700

The Assistant Commissioner for Patents is
hereby authorized to charge payment to
Deposit Account No. 18-0350 of any fees
associated with this communication.

RECEIVED
SEP 12 2002
TECHNICAL CENTER 28000